

# **Indiana NOx Budget Trading Program**

## **Energy Efficiency & Renewable Energy Set-Aside Guidance Manual**

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## INTRODUCTION

On June 6, 2001, the Air Pollution Control Board adopted two rules required by U.S. EPA to address the ground level ozone pollution problem in the eastern United States. One of those rules, 326 IAC 10-4, establishes a budget and trading program for emissions of nitrogen oxides (NOx) from certain large industrial sources in the state of Indiana that will be part of a larger regional trading program administered by U.S. EPA.

Indiana will be part of a regional NOx trading program that will involve 22 states east of the Mississippi River and the District of Columbia. Because this is a regional trading program, U.S. EPA will administer the program and the NOx Allowance Tracking System (NATS). Participants in the trading program will have trading accounts that will be used to hold NOx allowances that can be used for compliance or sold on the open market. The public can obtain information about the NOx trading program and individual trading accounts and transactions via a U.S. EPA website ([www.epa.gov/airmarkets](http://www.epa.gov/airmarkets)). While IDEM will be making NOx allowance allocations to individual sources, U.S. EPA as the administrator of the tracking system will oversee all transfers and deductions.

The NOx trading program establishes a NOx "budget" or "cap" for utility and large industrial boilers, combustion turbines and combined cycle systems. The budget is the total NOx emissions allowable from the NOx emissions units subject to the rule during the ozone season (May through September). U.S. EPA set this number for each state based on estimates of future emissions, assuming growth and the use of emission controls. Under the "cap and trade" system established by EPA, emissions units are assigned by each state a limited number of emission allowances corresponding to the emission reduction targets set for them under the NOx rule. Facilities may meet their NOx reduction targets by installing control equipment or by purchasing allowances from others, or some combination of the two. Under the NOx allowances trading system that will develop, allowances will attain a "market value" as emitting facilities seek the most cost-effective means of meeting their NOx allocations. The Indiana Air Pollution Control Board chose not to allocate the full emission allowance budget to existing emissions units, but to "set-aside" a percentage of the budget for three purposes. The three set-asides are a new electricity generating unit (EGU) set-aside, a new nonEGU (large industrial boilers) set-aside, and an energy efficiency and renewable energy set-aside. This guidance document focuses on the energy efficiency and renewable energy (EE/RE) set-aside and the procedures for the application and distribution of NOx allowances from this set-aside for certain EE/RE projects.

IDEM believes that the inclusion of a set-aside specifically for EE/RE projects will provide several benefits. By providing EE/RE projects with allowances that can be sold into the NOx allowance trading system, the set-aside will help to improve air quality by providing incentives to produce energy using low or zero-emitting technologies and to prevent NOx emissions by increasing the efficiency of energy generation or use. Besides improving air quality, a set-aside that provides incentives for a variety of highly efficient or low emitting technologies will also diversify energy production in Indiana and provide greater system reliability.

The EE/RE set-aside included in Indiana's rule can be used to provide NOx allowances to various EE/RE projects including demand side management projects, renewable energy projects, installation of highly efficient electrical generation, and other energy efficiency projects. Although IDEM will be responsible for the actual allocation and transfer of the NOx allowances to the individual projects, IDEM will work closely with the Indiana Department of Commerce (IDOC), Energy Policy Division. The Energy Policy Division has the expertise needed to assist IDEM in reviewing the projects and determining the actual energy savings or displacement. The total amount of NOx allowances available for distribution from the EE/RE set-aside each year is 1,103 tons. This amount can grow to 2,206 tons through the carry over of unallocated allowances

from one year to the next. A description of the various projects that can take advantage of the set-aside is included in the "Who/what is eligible?" section of the guidance.

The number of allowances available for a particular project depends on how much energy it saves or displaces. Two pieces of information are necessary to calculate the amount of NOx associated with a certain amount of electricity or other energy saved or displaced. First, the amount of electricity or other energy saved or generation displaced by the EE/RE project during the summer ozone season must be quantified. Second, a NOx emissions factor must be determined.

Due to the variability of the different projects, IDEM has included different equations for the various projects (see Allocation Process). The equations will be used to convert energy savings, or generation in the case of renewable energy or highly efficient generation, from the EE/RE project into NOx allowances and were provided by staff from the Energy Division of the Department of Commerce. Each equation includes a NOx emission factor, which will vary depending on the type of projects.

Because many of the projects may be small in nature and IDEM cannot allocate allowances in increments less than one ton (one NOx allowance = one ton of NOx emissions), the rule allows project sponsors to aggregate several projects together so that an individual request will equal at least one ton. This is also important because the energy savings must occur during the ozone season, May 1 to September 30, and this further limits the total amount of energy savings that would be converted to NOx allowances. Since the energy savings from the EE/RE projects are expected to occur for the life of the project (although the energy savings may decrease with time), IDEM allows project sponsors to apply for NOx allowances yearly for a period of five years.

During the rulemaking, some commentors expressed concern that certain projects involving increasing efficiency at large, existing utility units could deplete the EE/RE set-aside by requesting large amounts of NOx allowances from the EE/RE set-aside. It was thought that the depletion of the EE/RE set-aside by these projects would not allow for NOx allowances for a variety of other environmentally beneficial projects. IDEM has included provisions in the rule that provides a distribution hierarchy for NOx allowances. Projects that are considered to be more environmentally beneficial are allocated NOx allowances first, then NOx allowances are allocated to projects that are considered to be less environmentally beneficial, and efficiency projects at existing utility units are allocated last. This distribution hierarchy was chosen because the existing utility units will already realize benefits (reducing NOx emissions and having left over NOx allowances) with the efficiency projects and are less likely to need an additional incentive to implement the project.

In order to assist potential applicants and receive applications that provide consistent information, IDEM has developed forms to be used for applications and documentation of project energy savings (see Appendix A). In order to document the energy savings and receive the NOx allowances, project sponsors must use established measurement and verification procedures. U.S. EPA is working on providing measurement and verification guidance and the Department of Energy and other institutions have developed approved measurement and verification procedures. Some of these measurement and verification procedures are domestic and others are international.

This manual covers:

- Which projects may apply for allowances
- How the NOx allowance tracking system works
- How to determine the number of allowances a project may receive
- What kind of documentation and reporting are required

- How the energy savings will be quantified and verified
- Who to contact for more information or assistance

## **WHOWHAT IS ELIGIBLE?**

### **A. What Types of Projects are Eligible?**

Generally, the projects that are eligible to request NOx allowances from the EE/RE set-aside are projects that reduce the consumption of electricity, reduce the consumption of energy other than electricity, and projects that involve the generation of electricity using renewable energy. The first type of project is eligible because reducing the consumption of electricity reduces the amount of fuel that is burned to generate the electricity and thus NOx emissions are reduced. Likewise, the second type of project also reduces NOx emissions by reducing fuel combustion. Renewable energy projects, especially zero emission projects such as solar or wind, displace or replace traditional electrical generation with non-emitting generation and also reduce NOx emissions.

In addition, certain types of "highly efficient" electricity generation projects are eligible for NOx allowances from the EE/RE set-aside. Highly efficient electricity generation projects for the predominant use of a single end user or highly efficient generation projects that replace or displace existing generating equipment are eligible to apply for NOx allowances. Projects for the predominant use of a single user could involve combined cycle systems, combined heat and power, microturbines or fuel cells. In most cases, this would involve an industrial site or large commercial building that uses one of the technologies to replace or displace electricity from existing electric utility sources.

Following is a list of types of projects that are eligible for allowances, along with criteria for determining if certain projects qualify for allowances:

- End-use energy efficiency projects, including demand-side management programs.
- Highly efficient electricity generation for the predominant use of a single end user, such as combined cycle, combined heat and power, microturbines, and fuel cell systems. In order to be considered as highly efficient electricity generation, generating systems must meet or exceed the following thresholds:
  - For combined heat and power projects generating both electricity and thermal energy for space, water, or industrial process heat, rated energy efficiency of sixty percent (60%).
  - For microturbine projects rated at or below five hundred (500) kilowatts generating capacity, rated energy efficiency of forty percent (40%).
  - For combined cycle projects rated at greater than five hundred (500) kilowatts, rated energy efficiency of fifty percent (50%).
  - For fuel cell systems, rated energy efficiency of forty percent (40%), whether or not the fuel cell system is part of a combined heat and power energy system.
- Zero emission renewable energy projects that displace electricity produced by a utility for the power grid. Projects in this category should involve energy resources that either cannot be depleted (e.g. wind and sun) or that can be rapidly replenished (such as biomass) and that do not emit NOx or other criteria pollutants (SO<sub>2</sub>, lead, particulate matter, CO, ozone) during their operation. Examples could include photovoltaics, wind turbines, hydropower, or ethanol-powered fuel cells. Other technologies that meet the criteria above will also be considered. Hydropower projects are restricted to systems that either employ a head ten feet or less or that make use of dam that was in existence prior to September 16, 2001.
- Energy efficiency projects generating electricity through the capture of methane gas from sanitary landfills, water treatment plants, sewage treatment plants, or anaerobic digestion systems operating on animal and/or plant wastes.
- The installation of highly efficient electricity generation equipment for the sale of power where such equipment replaces or displaces retired electrical generating units (combined cycle systems, combustion turbines or boilers serving generators greater than 25 megawatts). In order to be considered

as highly efficient, generation equipment must meet or exceed the following energy efficiency thresholds:

- For coal-fired electrical generation units, rated energy efficiency of 42%.
- For natural gas-fired electrical generating units, rated energy efficiency of 50%.
- Improvements to existing fossil fuel fired electrical generation units that increase the efficiency of the unit and decrease the heat rate used to generate electricity. It is expected that the improvements implemented under this category would result in at least a one percent increase in efficiency.

End-use energy efficiency projects, including demand-side management programs, can include a number of different types of projects implemented by a variety of organizations and businesses. Some typical end-use energy efficiency projects include lighting retrofits using more efficient lights and building retrofit projects that decrease energy needed for heating and cooling. These types of projects could also involve changes at manufacturing operations that significantly reduce the energy needed for production. Installation of energy efficient equipment or changing processes in a way that increases energy efficiency and reduces fuel usage are two examples. Below is a list of potential end-use energy efficiency technologies presented in U.S. EPA guidance.

**Table 4: List of End-use Energy Efficiency Technologies  
Potentially Eligible for Set-Aside Allowances<sup>1</sup>**

**Lighting Technologies**

- Lighting efficiency projects
- Daylighting
- Lighting controls projects

**HVAC and Refrigeration Technologies**

- Chiller replacement projects
- Air cooling and refrigeration compressor replacement projects
- Packaged cooling unit replacement projects
- Variable air volume conversion projects
- Air side economizer projects
- Water side economizer projects
- Comfort cooling air handler motor efficiency upgrades
- Air handler variable speed drive installations
- Heating and cooling related savings from energy management systems
- Cooling tower motor efficiency upgrades

Cooling tower motor variable speed drive installations

- Constant speed ventilation
- Evaporative cooling and pre-cooling
- Exterior and interior window shading in air
- Special window glazing and glazing

treatments in air conditioned buildings

- Hot-spot ventilation in air-conditioned buildings (such as attic vents and fans)
- Heat transfer (including heat pumps) to heat sinks, such as ground source cooling in air conditioned buildings
- Projects that upgrade the efficiency or controls of heating equipment
- Refrigerated case door projects

**Motors/Other Energy Efficient Technologies**

- Variable speed drive installations on industrial fans and pumps
- Industrial process applications
- Projects improving building hot water efficiency
- Cogeneration or Combined Heat and Power (CHP) projects

**Technologies not recommended for eligibility under the NOx SIP Call EE set-aside program**

- Actions with a measurable lifespan of less than 3 years
- Measures that do not meet federal and state

<sup>1</sup> Creating an Energy Efficiency and Renewable Energy Set-aside in the NOx Budget Trading Program: Designing the Administrative and Quantitative Elements, U.S. EPA, EPA-430-K-00-004, April 2000, page 11.

- minimum energy efficiency standards
- Actions that save energy because of operational changes
- Load shifting technologies
- Fuel switching projects
- Measures that are removable without the use of tools

U.S. EPA has provided the following case studies of actual energy efficiency retrofits and upgrades. These illustrate realistic projects of the type that would be eligible for NOx allowances.<sup>2</sup>

#### Office lighting retrofit

A financial institution with locations throughout the state of Maryland implemented lighting retrofits at a total of 2.5 million square feet of retail branches, administrative office buildings, and data centers. They replaced 4500 176-wattage lighting fixtures with energy efficient lighting that uses only 70 watts to deliver the same light output. In addition, they installed several thousand energy efficient T8s and electronic ballasts. To maximize these savings, they also installed lighting occupancy sensors that are programmed to power down during non-use periods. In total, they saved 2.8 million kWh per ozone season. Using the equations in Indiana's rule, the project sponsor could request two (2) NOx allowances based on the energy savings involved with this project.

#### Commercial building envelope retrofit

A retailer completes a variety of energy efficient retrofits at a number of different store locations. They install lighting upgrades at 170 stores, including installation of compact fluorescent lighting. In addition, they undertake full building envelope upgrades at 40 stores, such as energy management systems, energy efficient HVAC and windows, and LED exit signs. In particular, at most of these stores, they downsize their cooling systems from the original (and oversized) systems by installing smaller pumps and installing low-e glass windows to cut down on their heating and cooling load. In total, the retailer saves 4 million kWh per ozone season. In this example, the project sponsor could request three (3) NOx allowances based on the energy savings from this project.

#### New residential construction

A developer of energy-efficient homes constructs several subdivisions of homes. The homes, all of which have the same basic floor plan, meet the national model energy code for insulation and equipment. For 80% of the homes, the developer upgrades the windows, seals and insulates the ducts, seals the homes against infiltration of outside air, improves the water heater efficiency, and installs programmable thermostats. The result is approximately 30% savings from those of a typical house meeting the model energy code. For the remaining 20% of homes constructed, in addition to the upgrades already mentioned, the developer decides to strive for an even higher level of efficiency. In these homes, the developer installs a high-efficiency gas furnace and water heater, energy efficient lighting (T8s, compact fluorescents, photocell/motion detectors on outside lighting) and energy efficient appliances (including Energy Star refrigerators, horizontal-axis washers, and smart-logic dishwashers). The developer builds 4500 homes, and saves 1.4 million kWh of energy per summer ozone season relative to standard efficiency. The project developer could be awarded one (1) NOx allowance based on the energy savings involved, assuming each of the home owners assigned their allowance rights to the developer (see below).

#### Industrial Plant Retrofit

An industrial plant, which employs 400 people, manufactures \$18 million worth of linear position and pressure transducers each year. Electricity powers the majority of the process-related equipment, air conditioning, and lighting. Natural gas is used for space heating and hot water, about 10% of total energy

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<sup>2</sup> Creating an Energy Efficiency and Renewable Energy Set-aside in the NOx Budget Trading Program: Designing the Administrative and Quantitative Elements, Volume 2, U.S. EPA, EPA-430-K-00-004, April 2000, pages 12 and 13.



use. The plant owner implements energy efficiency retrofits that include replacing five chillers with a single unit sized to match the system load, replacing lamps and ballasts, installing reflectors in fluorescent fixtures, reducing the lighting operating hours for unoccupied areas. In addition, the company used a time clock controller to reduce the operating hours of hot water circulation pumps, insulating hot water lines, replacing 14 motors with high-efficiency replacements, and repairing leaks in the compressed air line. In total, the plant saves approximately 2.4 million kWh per year. The project sponsor could request two (2) NOx allowances based on the energy savings from this project.

In addition to the efficiency projects identified by U.S.EPA above, additional examples of potential efficient or renewable power generation are provided below:

#### Landfill Methane

A landfill that is already required to capture and flare the methane produced inside the landfill compresses the methane and sends it to four 800 kilowatt generators attached to reciprocating engines. The engines operate throughout the ozone season, producing 11,750,400 kilowatt hours of electricity for distribution on the power grid. The project sponsor could request nine (9) allowances based upon the energy produced by this project.

#### Wind Turbines

A wind development company determines that a small wind farm is commercially viable on top of a prominent ridge in Indiana. Ten turbines with a maximum output of 1.5 megawatts are installed. Because of the intermittency of wind generation, the turbines generate an average of 40% of their maximum capacity during the ozone season, producing a total of 22,032,000 kilowatt hours of electricity. The project sponsor could request seventeen (17) allowances based upon the energy produced by this project.

#### Advanced Combined Cycle Natural Gas Generator

A utility decides to increase its generation capacity by installing a General Electric "G" series combined cycle generator with a net generating capacity of 326 megawatts and an energy efficiency of 50%. During the ozone season, it is expected to operate as baseload power source, generating 1,197,072,000 kilowatt hours of electricity. Because this unit will be a unit subject to the emissions limitations of the NOx rule, and because it is also a NOx emitter, its allowances from the EERE set-aside are reduced. Nevertheless, subject to the availability of allowances, the project sponsor could request up to one hundred eighty (180) allowances based upon the energy produced by this project.

#### Combined Heat & Power Project

An athletic facility operates two 60 kilowatt microturbines full time during the ozone season. Waste heat from the microturbines is used to produce hot water for the building and to heat two swimming pools. The average rated energy efficiency during the ozone season is 60%. During full load, the system emits 0.4 lbs NOx/MWh. The system would be eligible for one (1) allowance per year based upon the electricity generated and the heat used.

While some of the NOx allowances may seem small, it should be noted that, as of April 30, 2002, NOx allowances for the years 2004-2006 were being traded at approximately \$4,000. A smaller project that generates only one NOx allowance could potentially realize up to \$20,000 over the 5 years that the project sponsor could apply for NOx allowances. Of course, the total dollar amount would depend on the market prices at the time.

### **B. Who May Be a Project Sponsor?**

Any individual, group, organization or business that uses electricity or other forms of energy and

can initiate, finance, or carry out projects that reduce or displace electricity generation or reduce other energy use may become the sponsor for projects that claim NOx allowances from the EE/RE set-aside. However, IDEM begins with the assumption that the owner of the property that compromises or incorporates the energy efficiency or renewable energy project is also the owner of any rights to NOx allowances and is thus considered to be the initial project sponsor. However, the right to claim allowances as a project sponsor may also be assigned or sold to other persons or companies that can then become the sponsor for a project. Examples of the types of entities that could be claim allowances as either initial or ultimate project sponsors include:

- Commercial and industrial building owners and operators;
- Energy service companies (ESCOs);
- Home builders and associations;
- Home owners associations;
- Federal, state and local government agencies;
- Commercial businesses;
- Manufacturers and other industrial energy users; and
- Manufacturers leasing or selling high energy efficiency equipment.
- Merchant power generators;
- Utilities

As indicated above, IDEM anticipates that the owner of the property or equipment would be the project sponsor and would be making to request for the NOx allowances. In cases where IDEM receives more than one request for NOx allowances for the same project, IDEM will have to return both requests to the sponsors. The sponsors will then have to negotiate who will make the request and the ultimate ownership of any NOx allowances. IDEM will not act as a mediator in situations where more than one project sponsor requests NOx allowances for the same project.

## **NOX ALLOWANCE TRACKING SYSTEM (NATS)**

Under the NOx budget trading program, NOx allowances are held in trading accounts, similar to a bank account, from which NOx allowances can be transferred for sale or deducted for compliance. U.S. EPA will administer the trading accounts and the NOx account tracking system. In order for IDEM to allocate NOx allowances to a specific project sponsor, a general trading account will have to be established by or for the project sponsor. In the case of utility sponsored projects, the utility will already have a compliance, and in some cases an overdraft account, that can be used for the allocation of EE/RE set-asides allowances. There is nothing in Indiana's rule that restricts a utility from opening a general account for EE/RE set-aside allowances or other purposes, if that is in the best interest of the company.

The first step in establishing a general account is the selection of an authorized account representative (AAR). This should be done after the NOx Allowance Application has been approved and before the end of the first ozone season in which the project(s) are implemented. The rule also allows for the designation of an alternate authorized account representative to act for the account representative when needed. This is important because **only** the account representative or alternate account representative can make submissions to U.S. EPA concerning the trading accounts and NOx allowances. The account representative or alternate account representative represents the interests of those that have a stake in the

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<sup>3</sup> Guidance on Establishing an Energy Efficiency and Renewable Energy (EE/RE) Set-Aside in the NOx Budget Trading Program, Volume 1, U.S. EPA, March 1999, page 17.

NOx general account. In cases where several entities are collaborating on a project, decisions will have to be made and agreements entered into concerning the selection of the appropriate account representative and alternate account representative and the distribution of NOx allowances. Once a determination has been made about who will serve as account representative and alternate account representative, a Certificate of Representation should be completed and sent to U.S. EPA. The Certificate of Representation form is available at [www.epa.gov/airmarkets/forms/#126](http://www.epa.gov/airmarkets/forms/#126) along with addresses for submittal of the form. A copy of the form should be sent to IDEM at the following address:

Indiana Department of Environmental Management  
Office of Air Quality, Compliance Branch  
ATTN: Roger Letterman  
P.O. Box 6015  
Indianapolis, IN 46206-6015

Once the authorized account representative is selected, the proper forms must be completed to establish a general account. Since U.S. EPA is administering the trading accounts, General Account forms must be sent to U.S. EPA to establish the account. The General Account form is available at [www.epa.gov/airmarkets/forms/#126](http://www.epa.gov/airmarkets/forms/#126) along with addresses for submittal of the form to the U.S. EPA. A copy should also be sent to IDEM at the address above. IDEM will need the information from these forms to properly transfer NOx allowances to the project sponsor's general account. Once a general account has been established, it will remain in effect, unless the account does not contain any NOx allowances and there has been no activity with the account for one year. In this situation, U.S. EPA will notify the authorized account representative that the account will be closed after twenty days. The authorized account representative must either transfer NOx allowances to the general account or provide U.S. EPA with a statement demonstrating that the general account should not be closed.

## **ALLOCATION PROCESS**

In order to receive NOx allowances from the EE/RE set-aside, a project sponsor must submit an application for the NOx allowances and have the application approved by IDEM in conjunction with the Department of Commerce. IDEM has developed standard forms to be used when applying for NOx allowances (see Appendix A). The project sponsor should complete the application forms and submit the forms to IDEM at the address above.

Under the NOx budget trading program, applicants must submit the NOx allowance application by September 1 of the year prior to the year for which allowances will be claimed. Because the EE/RE projects can reduce NOx emissions over several years, IDEM has included provisions to allow a project sponsor to apply for NOx allowances for up to five years, but the project sponsor will have to reapply each year.

Upon receipt of the application for NOx allowances, IDEM and Energy Policy Division, IDOC will review the application. The agencies will focus on the project description, the estimated energy and NOx emission savings, the measurement and verification methodology and supporting documentation. In some instances, IDEM will request that the project sponsor provide more information or a modified application. It is important that the project sponsor provide the requested information in a timely manner or an application could be delayed or even denied.

An important piece of information supplied in the application is the estimated electricity or other energy saved or displaced by the project. This is the key piece of information that is needed to calculate the amount of NOx allowances that will be reserved for the project and potentially transferred to the NOx

general account. When completing the application, the project sponsor should focus on providing detailed information about the estimated energy savings. The following formulas will be used to determine the amount of NOx allowances for the different types of projects that can apply for EE/RE set-aside allowances. The project sponsor should use these formulas to calculate the estimated energy savings and associated NOx allowances.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of electricity and that are sponsored by end-users or non-utility third parties receive allowances based upon the number of kilowatt hours of electricity saved during an ozone control period and the following formula:

$$\text{Allowances} = (\text{kWS} * 0.0015) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

kWS = The number of kilowatt hours of electricity saved during an ozone control period by the project.

0.0015 = The assumed emission rate (in pounds of NOx per kilowatt hour) of a coal-fired electric utility generator in Indiana. This is the amount of NOx that energy conservation is presumed to prevent.

2000 = The conversion factor necessary to convert pounds of NOx per kilowatt hour into tons of NOx per kilowatt hour for the purposes of allocating allowances.

If the project is a new project (not a retrofit or upgrade), energy savings should be calculated by comparing the energy efficiency of comparable current industry-standard equipment to the equipment used in the project.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of electricity and that are sponsored by NOx allowance account holders that own or operate units that produce electricity and are subject to 326 IAC 10-4 will be awarded allowances according to the following formula:

$$\text{Allowances} = (\text{kWS} * 0.000375) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

kWS = The number of kilowatt hours of electricity saved during an ozone control period by the project.

0.00375 = 25% of the assumed emission rate (in pounds per kilowatt hour) of a coal-fired electric utility generator in Indiana. Because emission sources controlled under the NOx rule realize a short term benefit for reducing NOx emissions that is separate from the EE/RE set-aside program, such sources are to be allocated EE/RE allowances at 25% the rate of other applicants.

2000 = The conversion factor necessary to convert pounds of NOx per kilowatt hour into tons of NOx per kilowatt hour for the purposes of allocating allowances.

If the project is a new project (not a retrofit or upgrade), energy savings should be calculated by comparing the energy efficiency of comparable current industry-standard equipment to the equipment used in the project.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of energy other than electricity and that are not NO<sub>x</sub> budget units (a NO<sub>x</sub> budget unit is a boiler, combustion turbine or combined cycle system that is subject to 326 IAC 10-4) will be awarded allowances according to the following formula:

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) * \text{Pt2} * \text{NPt2} * (\text{NPt1}/\text{NPt2}) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

Et1 = Energy consumed per ozone control period prior to project implementation.

Pt1 = Units of product produced per ozone control period prior to project implementation.

Et2 = Energy consumed in the most recent ozone control period.

Pt2 = Units of product produced in the most recent ozone control period.

NPt1 = NO<sub>x</sub> produced during the consumption of energy, measured in pounds per million (1,000,000) British thermal units prior to project implementation.

NPt2 = NO<sub>x</sub> produced during the consumption of energy, measured in pounds per million (1,000,000) British thermal units in the most recent ozone control period.

2000 = The conversion factor necessary to convert pounds of NO<sub>x</sub> per kilowatt hour into tons of NO<sub>x</sub> per kilowatt hour for the purposes of allocating allowances.

If the project is a new project (not a retrofit or upgrade), Et1 should be calculated using the energy rates of comparable current industry-standard equipment.

- End-use energy efficiency projects, including demand-side management programs that claim allowances based upon reductions in the consumption of energy other than electricity and that are NO<sub>x</sub> budget units will be awarded allowances according to the following formula:

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) * \text{Pt2} * \text{NPt2} * (\text{NPt1}/\text{NPt2}) * 0.25)/2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

Et1 = Energy consumed per ozone control period prior to project implementation.

Pt1 = Units of product produced per ozone control period prior to project implementation.

Et2 = Energy consumed in the most recent ozone control period.

Pt2 = Units of product produced in the most recent ozone control period.

NPt1 = NO<sub>x</sub> produced during the consumption of energy, measured in pounds per million (1,000,000) British thermal units prior to project implementation.

NPt2 = NO<sub>x</sub> produced during the consumption of energy, measured in pounds per million (1,000,000) British thermal units in the most recent ozone control period.

0.25 = 25% of the saved NO<sub>x</sub> emissions. Because emission sources controlled under the NO<sub>x</sub> rule realize a short term benefit for reducing NO<sub>x</sub> emissions that is separate from the EE/RE set-aside program, such sources are to be allocated EE/RE allowances at 25% the rate of other applicants.

2000 = The conversion factor necessary to convert pounds of NO<sub>x</sub> per kilowatt hour into tons of NO<sub>x</sub> per kilowatt hour for the purposes of allocating allowances.

If the project is a new project (not a retrofit or upgrade), Et1 should be calculated using the energy rates of comparable current industry-standard equipment.

Product produced, as used in this and the previous formula, may include manufactured items;

raw, intermediate, or final materials; or other products measured in discrete units and produced as a result of the consumption of energy in a specific process or piece of equipment. Claims for allowances must include documentation of NO<sub>x</sub> emissions per British thermal unit both before and after implementation of the project for the energy-consuming process for which energy savings are claimed.

- Highly efficient electricity generation projects using systems such as combined cycle, microturbines, and fuel cell systems for the predominant use of a single end user, that meet rated energy efficiency thresholds of 50% for combined cycle systems and 40% for microturbines and fuel cells, that are not electric generating units or large affected units as defined in 326 IAC 10-4-2, and that are sponsored by end-users or non-utility third parties, receive allowances based upon the net amount of electricity generated during an ozone control period and the following formula:

$$\text{Allowances} = (\text{kWG} * (0.0015 - \text{NOx})) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

KWG = The number of net kilowatt hours of electricity generated during an ozone control period by the project.

0.0015 = The assumed emission rate (in pounds of NO<sub>x</sub> per kilowatt hour) of a coal-fired electric utility generator in Indiana. This is the amount of NO<sub>x</sub> that energy conservation is presumed to prevent.

NO<sub>x</sub> = The amount of NO<sub>x</sub> produced during the generation of electricity, measures in pounds per kilowatt hour.

2000 = The conversion factor necessary to convert pounds of NO<sub>x</sub> per kilowatt hour into tons of NO<sub>x</sub> per kilowatt hour for the purposes of allocating allowances.

- Highly efficient electricity generation projects using systems such as combined cycle, microturbines, and fuel cell systems for the predominant use of a single end user, that meet a rated energy efficiency threshold of 60% for combined cycle systems and 40% for microturbines and fuel cells, that are electric generating units or large affected units as defined in 326 IAC 10-4-2, and that are sponsored by end-users or non-utility third parties, receive allowances based upon the net amount of electricity generated during an ozone control period and the following formula:

$$\text{Allowances} = (\text{kWG} * (0.0015 - \text{NOx})) * (0.25) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

KWG = The number of net kilowatt hours of electricity generated during an ozone control period by the project.

0.0015 = The assumed emission rate (in pounds of NO<sub>x</sub> per kilowatt hour) of a coal-fired electric utility generator in Indiana. This is the amount of NO<sub>x</sub> that energy conservation is presumed to prevent.

NO<sub>x</sub> = The amount of NO<sub>x</sub> produced during the generation of electricity, measures in pounds per kilowatt hour.

0.25 = 25% of the saved NO<sub>x</sub> emissions. Because emission sources controlled under the NO<sub>x</sub> rule realize a short term benefit for reducing NO<sub>x</sub> emissions that is separate from the EE/RE set-aside program, such sources are to be allocated EE/RE allowances at 25% the rate of other applicants.

2000 = The conversion factor necessary to convert pounds of NO<sub>x</sub> per kilowatt hour into tons of NO<sub>x</sub> per kilowatt hour for the purposes of allocating allowances.

- Highly efficient combined heat and power systems for the predominant use of a single end user, that meet a rated energy efficiency threshold of 60%, that are not electric generating units or large affected units as defined in 326 IAC 10-4-2, and that are sponsored by end-users or non-utility third parties, receive allowances based upon the net amount of energy generated and used during an ozone control period and according to the following formula:

$$\text{Allow} = ((\text{BtuIn} * \text{Efficiency}) / 3,412) * (0.0015 - (\text{NOxRate} / \text{EnRate})) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

BtuIn = The number of British thermal units (Btu) of fuel used to produce electricity, heat, or steam during an ozone control period by the project.

Efficiency = The effective net efficiency of a combined heat and power system, calculated as:

$$(\text{kWG} * 3,412) / (\text{BtuIn} - \text{HeatOut}).$$

Where: kWG = The number of net kilowatt hours of electricity generated during an ozone control period by the project;

And where HeatOut = The number of British thermal units (Btu) of heat or steam effectively used for space, water, or industrial process heat during an ozone control period by the project, divided by 0.8

3,412 = The conversion factor for changing Btu's into kilowatt hours of electricity.

0.0015 = The assumed emission rate (in pounds of NOx per kilowatt hour) of a coal-fired electric utility generator in Indiana. This is the amount of NOx that energy conservation is presumed to prevent.

NOxRate = NOx emitted, measured in pounds per hour of normal system operation.

EnRate = The amount of energy measured in British thermal units (Btus) of electricity generated and heat or steam effectively used for space, water, or industrial process heat per hour of normal system operation, divided by 3,412.

2000 = The conversion factor necessary to convert pounds of NOx per kilowatt hour into tons of NOx per kilowatt hour for the purposes of allocating allowances.

- Zero-emission renewable energy projects, including wind, photovoltaic, and eligible hydropower projects and energy efficiency projects generating electricity through the capture of methane gas from sanitary landfills, water treatment plants, or sewage treatment plants receive allowances based upon the number of kilowatt hours of electricity each project generates during an ozone control period and according to the following formula:

$$\text{Allowances} = (\text{kWG} * 0.0015) / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

kWG = The number of kilowatt hours of electricity generated during an ozone control period by the project.

0.0015 = The assumed emission rate (in pounds of NOx per kilowatt hour) of a coal-fired electric utility generator in Indiana. This is the amount of NOx that energy conservation is presumed to prevent.

2000 = The conversion factor necessary to convert pounds of NOx per kilowatt hour into tons of NOx per kilowatt hour for the purposes of allocating allowances.

- The installation of highly efficient electricity generation equipment for the sale of power where such equipment replaces or displaces retired electrical generating units and improvements to existing fossil fuel fired electrical generation units that increase the efficiency of the unit and decrease the heat rate used to generate electricity receive allowances based upon the difference in emitted NO<sub>x</sub> per megawatt hour of operation for units before and after replacement or improvement and according to the following formula:

$$\text{Allowances} = ((Et1 - Et2) * h) * 0.25 / 2000$$

Where: Allowances = The number of allowances awarded to a project sponsor.

Et1 = The emission rate in pounds per megawatt hour of NO<sub>x</sub> of the unit before improvement or replacement.

Et2 = The emission rate in pounds per megawatt hour of NO<sub>x</sub> of the unit after improvement or replacement.

h = The number of megawatt hours of operation during the ozone control period.

0.25 = 25% of the saved NO<sub>x</sub> emissions. Because emission sources controlled under the NO<sub>x</sub> rule realize a short term benefit for reducing NO<sub>x</sub> emissions that is separate from the EE/RE set-aside program, such sources are to be allocated EE/RE allowances at 25% the rate of other applicants.

2000 = The conversion factor necessary to convert pounds of NO<sub>x</sub> per kilowatt hour into tons of NO<sub>x</sub> per kilowatt hour for the purposes of allocating allowances.

As part of the application, the project sponsor will request that IDEM reserve a certain number of NO<sub>x</sub> allowances to be awarded for the project savings using the appropriate equation above. The NO<sub>x</sub> trading program rule requires that an individual project must achieve at least one ton (2,000 pounds) of NO<sub>x</sub> reductions or savings. If an individual project will not result in at least one ton of NO<sub>x</sub>, the project sponsor will need to partner with another sponsor working on another project or sponsor another project that can be consolidated together to meet the minimum requirements. Note that, for the purposes of requesting and awarding NO<sub>x</sub> allowances, fractions will be rounded to the nearest whole number. This is necessary because the U.S. EPA account tracking system only works with whole NO<sub>x</sub> allowances. If an applicant finds that the relevant equation for his/her project yields a result of 1.3 tons (or 2,600 pounds of NO<sub>x</sub> displaced), they may seek one full allowance equivalent to one ton (2,000 pounds) of NO<sub>x</sub>. However, an applicant whose project yields 1.8 tons (3,600 pounds of NO<sub>x</sub>) would be eligible for two allowances.

Once IDEM and IDOC have received and reviewed the application, the following will occur:

- If IDEM and IDOC agree with the information, the application will be approved and IDEM will reserve the number of NO<sub>x</sub> allowances requested by the project sponsor.
- If IDEM and IDOC determine that the number of NO<sub>x</sub> allowances should be adjusted, IDEM will reserve NO<sub>x</sub> allowances in an adjusted amount that is different than the amount requested in the application.

It should be noted that the reservation of NO<sub>x</sub> allowances does not mean that IDEM will automatically transfer the full amount of NO<sub>x</sub> allowances to the project sponsor's general account. NO<sub>x</sub> allowances will be awarded only after verification of project implementation and certification of energy or electricity savings, as appropriate.

At the end of the first ozone season during which the project is implemented, the project sponsor must submit a Notification of Ozone Control Period Results and provide documentation of the actual energy savings that resulted from the project implementation. The Notification of Ozone Control Period Results report should also include an official request by the authorized account representative that IDEM transfer the appropriate NO<sub>x</sub> allowances to the general account established for the project sponsor(s). The department



will consult the IDOC concerning verification and certification of the actual savings. In cases where the EE/RE set-aside is oversubscribed, IDEM will have to adjust the NOx allowances on a pro rata basis. Some adjustment may be necessary when following the EE/RE set-aside allocation hierarchy also. Once a determination is made concerning the appropriate energy savings and associated NOx allowances, and any adjustments, IDEM will notify U.S. EPA to transfer NOx allowances to the general account designated by the authorized account representative. After IDEM has submitted the transfer to U.S. EPA, a confirmation of the transaction will be sent to the authorized account representative and project sponsor.

If a project sponsor wishes to make a transaction with companies subject to the NOx budget trading program prior to the “true up” date (November 30<sup>th</sup>), then the project sponsor should submit the Notification of Ozone Control Period Results as quickly as possible after the end of the ozone season. Any allowances allocated from the EE/RE set-aside after November 30<sup>th</sup> would be available for the following year or in the future.

Important deadlines:

- ✓ September 1<sup>st</sup> – Deadline for submittal of initial NOx allowance request and annual reapplication.
- ✓ November 30<sup>th</sup> – Deadline for receipt of Notification of Ozone Control Period Results reports and “true up” for NOx budget units.
- ✓ December 31<sup>st</sup> – Deadline for transfer of EE/RE set-aside NOx allowances to project sponsors for prior year activities or reservation of EE/RE set-aside allowances for the next ozone season.

## DOCUMENTATION AND REPORTING

IDEM has developed several forms and other documents that will be used in the EE/RE program. Copies of the forms are provided in Appendix A of this guidance. As discussed above, the Certificate of Representation and General Account form are two important forms that must be completed to designate an authorized account representative and establish a NOx trading account for holding NOx allowances and the EE/RE Set-Aside NOx Allowance Application. These are U.S. EPA forms that must be obtained from U.S. EPA at [www.epa.gov/airmarkets/forms/#126](http://www.epa.gov/airmarkets/forms/#126).

Other forms and documents include form letters to notify an applicant of a project approval, a request for additional information or denial of the application and the notification of the NOx allowance transfer. The end of the season Notification of Ozone Control Period Results is another important document that will ultimately dictate the actual NOx allowances that are granted for a project and transferred to the general account.

The following steps, with associated forms, should be followed in the application for and receipt of NOx allowances from the EE/RE set-aside.

1. The project sponsor should complete and submit the NOx Allowance Application for the following ozone season. The application must be submitted by September 1<sup>st</sup> of the year prior to the ozone season for which allowances are claimed. Note also that requests for allowances may only be made for projects that are implemented within two years of the beginning of the first ozone season for which allowances are requested. IDEM and IDOC will review the application and will either send an approval letter indicating the amount of NOx allowances that have been reserved for the project, a notice of deficiency requesting more information, or an application denial letter.
2. Once the application has been approved, IDEM recommends that a project sponsor determine who will serve as the account representative and alternate account representative and submit the

Certification of Representation to U.S. EPA. Once the account representative and alternate account representative are established, the General Account form should be completed to establish the general account in allowance tracking system that IDEM will use to transfer NOx allowances to the project sponsor. As noted above, copies of the Certificate of Representation and General Account form should be submitted to IDEM in addition to the originals submitted to U.S. EPA. This should be completed after a NOx Allowance Application is approved, but no later than the end of the first ozone control period in which the EE/RE project has been implemented. This is very important because if these forms are not submitted to U.S. EPA and the General Account established, IDEM cannot transfer any NOx allowances for the EE/RE project.

3. After the end of the ozone control period, the project sponsor must submit the Notification of Ozone Control Period Results that documents the actual energy savings for the EE/RE project that occurred during the ozone season. IDEM recommends that the project sponsor submit the notification as soon as possible after the ozone season to allow for time to verify the information. Notifications received after November 15<sup>th</sup> could be delayed. After IDEM and IDOC have reviewed the Notification of Ozone Control Period Results, IDEM will either send a letter requesting more information or will send a Notification of Transfer indicating the actual number of allowances that have been transferred to the project sponsor's general account.
4. The NOx budget trading program rule allows a project sponsor to reapply for NOx allowances for five years. To reapply for the second year, the project sponsor should complete a Notification of Reapplication by September 1st. If there have been no changes in the EE/RE projects, there is no need for further information. In this situation, IDEM would repeat the process of reserving NOx allowances. If there have been modifications to the original project, the project sponsor must provide additional information concerning the modifications. The new information will be reviewed and the appropriate number of allowances will be reserved.
5. After the second ozone season, the project sponsor must submit the Notification of Ozone Control Period Results and the appropriate amount of NOx allowances will be transferred to the General Account. This process of reapplication and resubmittal of ozone season results can be repeated for the next three years.

## **MEASUREMENT AND VERIFICATION**

Measurement and verification of the energy savings, or generation in the case of renewable energy, is a crucial element of the NOx allocation process. Without adequate measurement and verification, IDEM and IDOC will not have the necessary information to determine the appropriate NOx allowances that should be awarded to an individual project. Project sponsors should pay close attention to developing adequate measurement and verification procedures when preparing a measurement and verification plan that must be included with the NOx Allowance Application. The measurement and verification procedures should include the methods and equipment that will be used to establish the baseline data for use in determining the actual energy savings after project implementation. There may be some situations where IDEM or IDOC may require additional measurement and verification activities beyond those proposed by the project sponsor.

As presented in various guidance documents, there are basically four options (A,B,C,D) for measurement and verification of energy savings or generation. The first is Option A that primarily relies on assumptions or stipulations along with calculations to determine the amount of energy savings for a particular project. The applicant would need to do some limited monitoring to establish baseline energy use and actual energy savings after the project is implemented. Option A is best suited for projects where a factor can be based on an assumption, historical data, or manufacturer's data. This option is also

appropriate for projects involving new – as opposed to retrofitted or upgraded – systems where no previous baseline energy consumption data or emission rate data exist. In many cases with Option A, a major element of the measurement and verification is inspections to verify that the actual project was installed as proposed.

Option B focuses on monitoring or end metering performance and operational parameters of the various project components. The same parameters would be measured during the establishment of the baseline data for later comparison. With Option B, the monitoring could be short-term, spot checks or continuous monitoring depending on the variability of the system. As with Option A, inspections may be a part of the measurement and verification procedures to ensure that the installation meets the specifications used to estimate the energy savings or generation.

Option C also focuses on monitoring or end metering energy use, but instead of component metering, the metering usually involves overall facility or building energy use. Utility billing information could be used to determine the baseline data and the post-installation data and a comparison of the data would provide the amount of energy savings. Regression analysis could also be used to estimate energy savings. In determining the baseline and post-implementation data, energy use data would have to be gathered for the entire ozone season.

Option D involves the use of computer models to estimate and determine energy savings. Inspections are used to verify the installation is performed according to specifications. Baseline and post-installation information is gathered and used with computer simulation to estimate potential savings. More information concerning Option D can be found in guidance documents such as the U.S. Department of Energy's *International Performance Measurement and Verification Protocol* or the *M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2*.

The measurement and verification option chosen will depend on the type of project that is being proposed. Considerations such as the type of project, the complexity of the project and the variability of the energy savings will help determine the appropriate measurement and verification option.

Because the period of compliance for sources in the NO<sub>x</sub> Budget Trading Program is the summer ozone season, only the electricity savings and displacements that occur during the summer ozone season (May 1 through September 30) are relevant for the purposes of determining NO<sub>x</sub> allowances. Thus, electricity savings that occur outside the ozone season, i.e. between October 1 and April 30, are not counted toward the achievement of the NO<sub>x</sub> emissions cap. It should be noted however, that although only ozone season reductions count towards allowances, many energy efficiency and renewable energy projects continue to provide benefits such as emissions reductions, cost savings, and job growth throughout the entire year.<sup>4</sup>

There are measurement and verification guidance documents that are currently available for measuring and verifying energy savings, such as the *International Performance Measurement and Verification Protocol*, U.S. EPA's *Conservation Verification Protocol*, U.S. Department of Energy's *M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2*, and the *New Jersey Measurement Protocol for Commercial and Industrial Facilities*. U.S. EPA has an Internet site that can be used to access various measurement and verification protocols and guidance documents and the address is provided below.

As mentioned previously, a NO<sub>x</sub> Allowance Application must include a measurement and

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<sup>4</sup> Creating an Energy Efficiency and Renewable Energy Set-aside in the NO<sub>x</sub> Budget Trading Program: Designing the Administrative and Quantitative Elements, Volume 2, U.S. EPA, EPA-430-K-00-004, April 2000, page 17.

verification plan. Project sponsors should use the information in this section and the guidance documents above to aid them in preparing the measurement and verification plan. For example, some of the items that are required by the U.S. Department of Energy in a measurement and verification plan for federal energy projects include the following<sup>5</sup>:

#### Project Measurement and Verification Plan Content Components

Category	Content Components	Example
Project description	Project goals and objectives	
	Site characteristics	
	Energy conservation measure descriptions that include how savings will be achieved	
Project savings	Estimated savings by energy conservation measure	
Scheduling	Equipment installations	
Reporting	Raw data format	Electronic, 15-minute kW
	Compiled data format	Monthly kWh
	Reporting interval	Annually
Measurement and verification approach	Accuracy requirements	10% savings uncertainty in savings estimates
	Options used	Option A, B, C, and/or D

#### Measure-Specific Measurement and Verification Plan Components

Category	Content Components	Example
Analysis method	Data requirements	kW, on-hours, temperature
	Stipulated values supporting data	Lighting operating hours equal 4000/year based on metered XYZ building
	Savings calculation equations	
	Regression expressions	Three parameter change-point cooling model
	Computer simulation models	DOE-2
Metering and monitoring	Metering protocols	ASHRAE GPC 14P pump multiple point test throughout short-term monitoring
	Equipment	
	Equipment calibration protocols	NIST protocols
	Metering points	Flowrate, RMS power
	Sampling	90% conf./10% prec.
	Metering duration and interval	2 weeks/15-minute data
Baseline determination	Performance factors	kW/ton
	Operating factors	Load, on-hours
	Existing service quality	Zone temps, lumen level
	Minimum performance standards	ASHRAE 90.1 1989
Savings adjustments	Party responsible for which changes	
	Normalized energy-use equations	
	Conceptual approaches	

<sup>5</sup> U.S. Department of Energy's M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2, pages 42 and 43.

The following list comes from the International Performance Measurement and Verification Protocol also developed by the Department of Energy<sup>6</sup>:

- A description of the energy conservation measure and its intended result.
- Identification of the boundaries of the savings determination. The boundaries may be as narrow as the flow of energy through a pipe or wire, or as broad as the total energy use of one or many buildings. The nature of any energy affects beyond the boundaries should be described and their possible impacts estimated.
- Documentation of the facility's baseyear conditions and resultant baseyear energy data. In performance contracts, baseyear energy use and baseyear conditions may be defined by either the owner or the ESCO, providing the other party is given adequate opportunity to verify it. A preliminary energy audit used for establishing the objectives of a savings program or terms of an energy performance contract is typically not adequate for planning measurement and verification activities. Usually a more comprehensive audit is required to gather the baseyear information relevant to measurement and verification:
  - Energy consumption and demand profiles
  - Occupancy type, density and periods
  - Space conditions or plant throughput for each operating period and season. (For example in a building this would include light level and color, space temperature, humidity and ventilation. An assessment of thermal comfort and/or indoor air quality (IAQ) may also prove useful in cases where the new system does not perform as well as the old inefficient system)
  - Equipment inventory: nameplate data, location, condition. Photographs or videotapes are effective ways to record equipment condition
  - Equipment operating practices (schedules and setpoint, actual temperatures/pressures)
  - Significant equipment problems or outages.

The specific elements of a measurement and verification plan will differ according to the specific type of project. Not all of the elements or components outlined above will be included in each and every measurement and verification plan. Each measurement and verification plan should be tailored to the individual project. In evaluating measurement and verification plans, IDEM and IDOC will attempt to work with applicants to establish plans that are reasonable given the type and scope of the project and the number of allowances sought.

Note that some measurement and verification plans should also include plans for determining emission rates (for projects where NO<sub>x</sub> emission rates are factored into the allowance allocation process). Depending upon the type and scope of the project, manufacturers' ratings, sample stack testing, or continuous emission monitors can be used to establish pre-project baselines and post-project rates.

It should be noted that most of the elements or components described above are relevant for energy conservation or energy efficiency projects. Projects involving the generation of electricity, whether through renewable energy sources or the use of highly efficient generation, would not include the same elements in a measurement and verification plan. Projects that generate electricity rather than saving electricity would have a much different measurement and verification plan. In most instances, the plan would focus on the metering of the generated electricity. There would be no need to establish a baseline for comparison with post-installation data because the NO<sub>x</sub> allowances will be based on the amount of electricity generated

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<sup>6</sup> U.S. Department of Energy, International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy Savings, Volume 1, October 2000.

<sup>7</sup> The non-routine adjustments arising during the post-retrofit period that cannot be anticipated and that require custom engineering analysis.

during an ozone season. Chapter 35 of U.S. Department of Energy's M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2 (<http://ateam.lbl.gov/mv/>) provides a discussion of the measurement and verification techniques applicable to renewable energy projects.

## CONTACT AND RESOURCE INFORMATION

IDEM: Roger Letterman  
Office: 317/232-8342 Fax: 317/233-6865  
Email: [rletterm@dem.state.in.us](mailto:rletterm@dem.state.in.us)

IDOC: Philip Powlick  
Office: 317/232-8970 Fax: 317/232-8995  
Email: [ppowlick@commerce.state.in.us](mailto:ppowlick@commerce.state.in.us)

IDEM NOx information website (forms and other information)  
<http://www.IN.gov/idem/air/standard/Sip/index.html>

U.S. EPA Clean Air Markets Division  
<http://www.epa.gov/airmarkets/>

U.S. EPA NOx Trading Program Forms  
<http://www.epa.gov/airmarkets/forms/#126>

U.S. EPA Energy Efficiency and Air Quality Resources  
[http://www.epa.gov/appdstar/state\\_local\\_govnt/state\\_outreach/eeresources.html](http://www.epa.gov/appdstar/state_local_govnt/state_outreach/eeresources.html)

U.S. EPA Measurement and Verification Information  
[http://www.epa.gov/appdstar/state\\_local\\_govnt/state\\_outreach/mresources.html](http://www.epa.gov/appdstar/state_local_govnt/state_outreach/mresources.html)

Lawrence Berkeley National Laboratory's Measurement and Verification Information Site  
<http://ateam.lbl.gov/mv/>





# **Indiana NOx Budget Trading Program**

## **Energy Efficiency & Renewable Energy Set-Aside Guidance Manual**

### **Appendix A**

#### **Forms and Instructions**



## EE/RE Set-Aside NOx Allowance Application

As part of Indiana's NOx budget trading program, IDEM has established an energy efficiency and renewable energy (EE/RE) set-aside. This set-aside can be used to provide NOx allowances to project sponsors based on the energy savings from EE/RE projects. Use this form to provide information about the project sponsor, the project or projects to be implemented, the energy savings, the measurement and verification procedures and the number of NOx allowances requested. In addition to the application forms, please submit any additional information (e.g. additional text, schematics, engineering reports) that could be useful to IDEM and IDOC in understanding that project. Also please include any information that would aid IDEM and IDOC in verifying the energy and emission savings projected, such as copies of manufacturers' specifications, past utility bills, emission rate reports, modeling data, etc.

For administrative use only:	
Assigned project code:	
Date received:	

Please provide the following information for the project sponsor (the entity or individual requesting allowances):

Project sponsor name:							
Address:							
City:		State:		Zip Code:			
Contact person:							
Telephone number:		Fax number:					
Email address (optional):							
Relationship of sponsor to project (e.g., owner, ESCO, etc.):							
Are there any additional entities that could potentially submit duplicate claims for the same project?				Yes:		No:	
If yes, please attach the names and contact information for any additional entities associated with the project that could potentially submit duplicate NOx allowance claims for the same projects.							

Please provide the following information for each project site:

Type of facility and the business activities conducted there:							
Project site name:							
Project site address:							
City:		State:		Zip code:			
Contact person:							
Telephone number:		Fax number:					
Email address (optional):							

If the overall project includes more than one project site, please provide the above information for each of the project sites included under this application and attach to the application.

**Ownership information**

Please provide a description of the ownership interests in the equipment that will be installed and operated as part of the project, including information about leasing agreements, contracts, etc. If more space is needed, please attach to the application.

**Project type and overview**


**Measurement and Verification Methodology**


Project implementation date:	
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**Historical data**

Please attach any documentation related to past energy consumption, energy generation, rated energy efficiency or billing data that will facilitate our review of your proposed project. This information is not needed for construction of new projects generating electricity.
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**Estimated Savings/Generation due to Project - Choose the appropriate table for the type of project to be implemented.**

**End use energy efficiency projects - electricity**

Type of Electricity End Use Project	Energy Efficiency Measure and Quantity of Equipment	kW Savings per Energy Efficiency Measure	Estimated Hours of Operation	Total Estimated kWh Savings

**End use energy efficiency projects - other energy**

Product Produced	Energy Consumed per Unit of Product Produced Prior to Implementation	Estimate of Energy Consumed per Unit of Production After Implementation	Estimated Units of Product Produced After Implementation	Pre-project NOx emission rate	Post-project NOx emission rate	Estimated Post-project NOx Emission Reduction

**Zero-emission renewable energy and methane gas electricity generation**

Type of Project	Rated Generation Capacity	Estimated Percent of Generation Capacity to be Realized	Total Estimated kWh Generated

**Highly efficient electricity generation - end user**

Type of Electricity Generation	Quantity of Equipment	Generation Capacity	Projected NOx Emission Rate	Projected Hours of Operation	Projected Electricity Produced

**Highly efficient combined heat and power - end user**

Type of Combined Heat and Power System	Fuel Consumed per Hour of Normal Operation	Electricity Generated per hour of normal operation	Heat effectively used per hour of normal operation	NOx emission rate per hour of normal operation	Projected Hours of Operation

**Highly efficient electricity generation/efficiency improvements - utilities**

NOx Emission Rate Before Improvement or Replacement	NOx Emission Rate After Improvement or Replacement	Estimated Number of Megawatt Hours of Operation	Estimated NOx Savings After Improvement or Replacement

**Application Agreement to be completed by the Project Sponsor**

The undersigned participant in the State of Indiana Energy Efficiency and Renewable Energy NOx Allowance Program recognizes and accepts that participation in this Program, and the receipt of any allowances, is predicated on the participant following all guidelines and procedures established for the Program.

These requirements include, but are not limited to:

- Following program procedures as detailed in the Energy Efficiency & Renewable Energy Set-Aside Guidance Manual (October 10, 2002)
- Meeting all submittal timelines
- Meeting all submittal requests
- All information submitted is complete and accurate
- All reductions are verified with the approved methodology and occur during the ozone season
- NOx allowances will only be transferred after the reductions have been verified by IDEM and IDOC, Energy Policy Division

I understand that eligibility to this program is contingent on meeting the Program requirements. I also authorize IDEM and IDOC to audit this energy efficiency and renewable energy project for purposes of verifying that the energy savings measures have been installed and that the measurement and verification of energy savings being carried out is in accordance with the approved measurement plan.

Please reserve the following amount of NOx allowances for the designated ozone season for this project:

Amount of NOx allowances:		Ozone season year:	
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Printed name:	
Signature:	
Date:	

Submit this form to the following address:

Indiana Department of Environmental Management  
Office of Air Quality, Compliance Branch  
ATTN: Roger Letterman  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015





## Instructions for NOx Allowance Application Form – EE/RE Set-aside

In addition to the application forms, please submit any additional information (e.g. additional text, schematics, engineering reports) that could be useful to IDEM in understanding that project. Also please include any information that would aid IDEM in verifying the energy and emission savings projected, such as copies of manufacturers' specifications, past utility bills, emission rate reports, modeling data, etc.

### Project sponsor information

Name: Please provide the name of the person or entity that will be sponsoring the project and requesting the NOx allowances.

Address: Please provide the address for the project sponsor including the city, state and zip code.

Contact person information: Please provide the name of the person to be contacted for information concerning the project. Also include a telephone and facsimile numbers for the contact person. An email address should also be provided, if available.

Relationship of sponsor to project: Please provide the relationship of the project sponsor to the project. Examples include an owner/operator of an industrial plant, an energy service company, or the owner/operator of a utility plant.

Information concerning additional entities and duplicate claims: Please indicate whether or not there are other individuals or companies associated or involved with the project implementation that could possibly submit a claim to NOx allowances generated by the project implementation. This could involve partners or individuals associated with multiple projects that are being aggregated for the purpose of gaining at least one ton of NOx reductions or savings. If there are other entities that could claim allowances, please provide the information above for each of the entities or individuals.

### Project site information

Type of facility and business activities: Please provide information about the type of facility and business activities (i.e., industrial manufacturing facility manufacturing auto parts, municipal solid waste landfill, electric utility plant, etc.).

Project site name: Self explanatory.

Project site address: Please provide the address of the project site, including the city, state and zip code.

Contact person information: Please provide the name of the person to be contacted for information concerning the project. Also include telephone and facsimile numbers for the contact person. An email address should also be provided, if available.

Where the project includes more than one project site, please provide the information above for each of the project sites and attach to the application.

### Ownership information

The owner of the equipment that will be installed and operated is generally considered to be the project sponsor. However, there may be situations where other arrangements may be made in connection with equipment ownership and the rights to NOx allowances. In addition, IDEM will not award allowances for one project or collection of projects to more than one project sponsor. In cases where two or more applications are received for a project or collection of projects, IDEM will reject the applications. Please provide a description or explanation of any ownership interests in equipment related to the project. This

information could include leasing agreements, contract information, or other agreements associated with the project.

### **Project type and overview**

Please describe the proposed project and include the type and quantity of equipment affected by this project (e.g., 5 HVAC systems, 10,000 light bulbs, 1 MW landfill methane capture project, cogeneration project). If additional space is required, please attach additional information.

For example:

A financial institution with locations throughout Indiana proposes to implement lighting retrofits at a total of 2.5 million square feet of retail branches, administrative office buildings, and data centers. The retrofit will include replacing 4500 176-wattage lighting fixtures with energy efficient lighting that use only 70 watts to deliver the same light output. In addition, several thousand energy efficient T8s and electronic ballasts will be installed. To maximize these savings, lighting occupancy sensors that are programmed to power down during non-use periods will be installed.

### **Measurement and verification methodology**

Please explain the project measurement and verification methodology and attach a detailed measurement and verification plan with diagrams and any other pertinent information. Specify what the pre-project and post-project energy consumption and/or production are estimated to be for this project. If more space is needed, please attach additional information. For more information, please see the Indiana NOx Trading Budget Program, Energy Efficiency and Renewable Energy Set-Aside Guidance Manual.

### **Project implementation date**

Please provide the date on which the project is to begin energy savings or generation. If the overall project consists of separate projects, provide the various implementation dates for the individual projects.

### **Historical data**

Please provide historical data related to the project for use in reviewing your application. The historical data should include information concerning past energy consumption, energy generation, rated energy efficiency or billing data. This information should cover several years of operation at least. Since new electricity generation projects would not have any historical data, this information is not required for new generation projects.

### **End use energy efficiency projects – electricity**

#### Type of Electricity End Use Project

Describe the type of project to be implemented. Example: building lighting retrofit, HVAC retrofit or entire building insulation retrofit.

#### Energy Efficiency Measure (EEM) and Quantity

Describe the energy efficiency measure that will be installed or implemented and include the quantity, where applicable. Example: 2000 T8s with electronic ballasts.

#### kW Savings per EEM

Provide the kilowatt savings for each energy efficiency measure to be installed or implemented.

**NOTE: Attach calculations and explanations for electricity savings, including pre- and post-project consumption for retrofits or comparison of high-efficiency equipment to standard equipment for new installations.**

#### Estimated Average Hours of Operation

Provide an estimate of the number of average hours that the energy efficiency measure will be operated during the ozone season (May 1 through September 30). If the energy efficiency measure will operate the entire ozone season, the hours of operation would be 3,672 hours.

#### Total Estimated kWh Savings

Provide the total estimated kilowatt-hour savings for the project over the course of the ozone season.

This is calculated by multiplying the number of energy efficiency measures, the kilowatt savings per energy efficiency measure, and the estimated hours of operation.

#### Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project. One equation is for projects sponsored by end users or non-utility third parties and the other is for projects sponsored by utilities.

End users/non-utility

$$\text{Allowances} = (\text{kWS} \times 0.0015)/2000$$

Utilities

$$\text{Allowances} = (\text{kWS} \times 0.000375)/2000$$

kWS = Total number of kilowatt-hours saved during the ozone season.

### **End use energy efficiency projects - other energy**

#### Product Produced

Describe the product produced or manufactured. Example: units of manufacture (wood cabinets, metal furniture, automotive parts) or pounds of steam.

#### Energy Consumed per Unit of Product Produced Prior to Implementation

Provide the amount of energy consumed per unit of product produced prior to implementation of the proposed project. Include the unit of measure (Btu, mmBtu).

#### Estimate of Energy Consumed per Unit of Production After Implementation

Provide the estimate of the amount of energy consumed per unit of product produced after implementation of the proposed project. Include the unit of measure (Btu, mmBtu).

#### Estimated Units of Product Produced After Implementation

Provide an estimate of the number of products produced per ozone season (May 1 to September 30) after the project has been implemented.

#### Pre-project NOx Emission Rate

Provide the NOx emission rate prior to implementation of the project in pounds of NOx emitted per mmBtu of energy consumed. The emission rate is the average emission rate during the ozone season, May 1 to September 30.

#### Post-project NOx Emission Rate

Provide the estimated NOx emission rate that will result after the project is implemented in pounds of NOx emitted per mmBtu. The emission rate is the average emission rate during the ozone season, May 1 to September 30.

#### Estimated Post-project NOx Emission Reduction

Provide the estimated NOx emission reduction over the ozone season after project implementation. This is calculated by multiplying the energy consumed per unit, the estimated unit of product produced and the NOx emission rate. Each of these values should be only for the ozone season, May 1 to September 30.

### Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project. One equation is for reductions from emission units that are not subject to the NOx budget trading program and one for units that are subject to the NOx budget trading program (see applicability under 326 IAC 10-4-1).

Units not subject to trading program

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) \times \text{Pt2} \times \text{NPt2} \times (\text{NPt1}/\text{NPt2})/2000$$

Units subject to trading program

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) \times \text{Pt2} \times \text{NPt2} \times ((\text{NPt1}/\text{NPt2}) \times 0.25)/2000$$

Et1 = Energy consumed per ozone season prior to implementation

Et2 = Estimate of energy consumed per ozone season after implementation

Pt1 = Units of product produced per ozone season prior to implementation

Pt2 = Estimated units of product produced per ozone season after implementation

NPt1 = NOx emission rate prior to implementation

NPt2 = NOx emission rate after implementation

### **Zero-emission renewable energy and methane gas electricity generation**

#### Type of Project

Describe the type of project that will be implemented. Example: landfill gas project with 4 generators, wind farm project with 10 generators or an anaerobic digestion project with 1 generator.

#### Rated Generation Capacity

Provide the manufacturer's generation capacity ("nameplate capacity") of the generator(s). If the project involves several generators with different generation capacities, provide the rated generation capacity of each generator and number of like generators.

#### Estimated Percent of Generation Capacity to be Realized

Provide an estimate of the percent of maximum generation capacity that will actually be realized during the ozone season (May 1 to September 30). For example, a wind farm will not generate electricity at maximum capacity during the entire ozone season. In the example given in the EE/RE guidance, the wind farm is only expected to realize 40% of the maximum generation capacity.

#### Total Estimated kWh Generated

Provide an estimate of the electricity to be generated during the ozone season (May 1 to September 30) in kilowatt hours.

### Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = (\text{kWG} \times 0.0015)/2000$$

kWG = The total number of kilowatt hours generated during the ozone season (May 1 to September 30).

### **Highly efficient electricity generation – end user**

#### Type of electricity generation

Describe the type of equipment that will be used to generate electricity (combined cycle, microturbine or fuel cell). To be eligible to apply under this category, the equipment must meet the following efficiency

thresholds:

For combined cycle > 500 kilowatts generating capacity, a rated energy efficiency greater than or equal to 50%.

For microturbines ≤ 500 kilowatts generating capacity, a rated energy efficiency greater than or equal to 40%.

For fuel cell systems, a rated energy efficiency of 40%.

Quantity of equipment

Provide the quantity of equipment that will be installed and operated.

Generation capacity

Provide the generation capacity of the equipment. Normally this is the maximum design capacity from the manufacturer (also known as “nameplate capacity”).

Projected NOx emission rate

Provide the projected NOx emission rate in pounds of NOx per kilowatt of electricity produced (lb/kW).

Projected hours of operation

Provide an estimate of the projected hours of operation for the equipment during the ozone season (May 1 to September 30).

Projected electricity produced

Provide an estimate of the projected amount of electricity to be produced during the ozone season (May 1 to September 30) in kilowatt-hours (kWh).

Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project.

For projects not subject to rule and sponsored by end-users or non-utility third parties:

$$\text{Allowances} = (\text{kWG} \times (0.0015 - \text{NOx})) \div 2000$$

For projects subject to the rule and sponsored by owners/operators of units subject to the rule:

$$\text{Allowances} = (\text{kWG} \times (0.0015 - \text{NOx}) \times 0.25) \div 2000$$

kWG = The number of net kilowatt-hours of electricity generated during the ozone season (May 1 to September 30).

NOx = The NOx emission rate measured in pounds per kilowatt-hour (lbs/kWh).

**Highly efficient combined heat and power – end user**

Type of combined heat and power system

Describe the type of combined heat and power system to be constructed. For example, a microturbine with heat recovery system.

Fuel consumed per hour of normal operation

Provide the anticipated fuel consumption per hour of normal operation (gallons of fuel oil, cubic feet of gas, etc.).

Electricity generated per hour of normal operation

Provide the estimated amount of electricity to be generated per hour of normal operation in kilowatt-hours (kWh).

Heat effectively used per hour of normal operation

Provide an estimate of the heat to be effectively used in Btus per hour (Btu/hr) of normal operation.

NOx emission rate

Provide the projected NOx emission rate in pounds per hour (lbs/hr) of normal operation.

Projected hours of operation

Provide the projected hours of operation during the ozone season (May 1 through September 30).

Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = ((\text{BtuIn} \times \text{Eff}) \div 3,412) \times (0.0015 - (\text{NOxRate} \div \text{EnRate})) \div 2000$$

BtuIn = The number of Btus of fuel used to produce electricity, heat, or steam during the ozone season (May 1 to September 30).

Eff = The effective net efficiency of the combined heat and power system, calculated as  
 $(\text{kWG} \times 3,412) \div (\text{BtuIn} - \text{HeatOut})$

kWG = The number of net kilowatt-hours of electricity generated during the ozone season.

HeatOut = The number of Btus of heat or steam effectively used for space, water, or industrial process heat during the ozone season divided by 0.8.

NOxRate = NOx emitted during normal operation, measured in pounds per hour (lbs/hr).

EnRate = The amount of energy, measured in Btus per hour of operation (Btu/hr), of electricity generated and heat or steam effectively used for space, water, or industrial process heat, divided by 3,412.

**Highly efficient electricity generation/efficiency improvements – utilities**

NOx Emission Rate Before Improvement or Replacement

Provide the NOx emission rate from the unit before the efficiency improvement or generation replacement in pounds per net megawatt hour of electricity produced (lb/MWh).

NOx Emission Rate After Improvement or Replacement

Provide the NOx emission rate from the unit after the efficiency improvement or generation replacement in pounds per net megawatt hour of electricity produced (lb/MWh).

Estimated Number of Megawatt Hours of Operation

Provide an estimate of the total number of megawatt hours of operation during the ozone season (May 1 to September 30).

Estimated NOx Reduction After Improvement or Replacement

Provide an estimate of the amount of NOx emissions that were reduced during the ozone season (May 1 to September 30) after the efficiency improvement or generation replacement. The estimate can be calculated by multiplying the difference in the NOx emission rate before and after the change by the total megawatt hours of operation.

Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = ((\text{Et1} - \text{Et2}) \times h) \times 0.25/2000$$

Et1 = The NOx emission rate in pounds per megawatt hour for the unit before the improvement or replacement.

Et2 = The NOx emission rate in pounds per megawatt hour for the unit after the improvement or replacement.

h = The number of megawatt hours of operation during the ozone season.





## EE/RE Set-Aside NOx Allowance Reapplication

Project sponsors should use this form to reapply for NOx allowances after an initial NOx Allowance Application has been approved. Project sponsors may be awarded NOx allowances for a period not to exceed five years.

<b>For administrative use only:</b>	
Date received:	

Project code:					
Project sponsor name:					
Address:					
City:		State:		Zip code:	
Contact person:					
Telephone number:					
Fax number:					
Email address (optional):					
Relationship of sponsor to project (e.g. owner, ESCO, etc.):					
Are there any additional entities that could potentially submit duplicate claims for the same project?				Yes:	No:
If yes, please attach the names and contact information for any additional entities associated with the project that could potentially submit duplicate NOx allowance claims for the same projects.					
Authorized account representative:					
NOx Account Number:					

Have there been any changes from the approved project?	Yes:	No:
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## **NOx Allowance Reapplication Form Instructions**

### **Project sponsor information**

Project code number: Please provide the project code assigned to this project and included with the initial approval letter.

Name: Please provide the name of the person or entity that will be sponsoring the project and requesting the NOx allowances.

Address: Please provide the address for the project sponsor including the city, state and zip code.

Contact person information: Please provide the name of the person to be contacted for information concerning the project. Also include a telephone and facsimile numbers for the contact person. An email address is also requested, but the email address is optional.

Relationship of sponsor to project: Please provide the relationship of the project sponsor to the project. This could be an owner/operator of an industrial plant, an energy service company, or the owner/operator of a utility plant.

Information concerning additional entities and duplicate claims: Please indicate whether or not there are other individuals or companies associated or involved with the project implementation that could possibly submit a claim to NOx allowances generated by the project implementation. This could involve partners or individuals associated with multiple projects that are being aggregated for the purpose of gaining at least one ton of NOx reductions or savings. If there are other entities that could claim allowances, please the information above for each of the entities or individuals.

Authorized account representative: Please provide the name of the authorized account representative for the NOx allowance tracking system account.

NOx Account Number: Please provide the account number for the NOx Allowance Tracking System Account for the project or project sponsor.

Have there been any changes from the approved project?: Please check Yes or No. If the answer is No, no further information is needed. If the answer is Yes, please complete a separate NOx Allowance Application for any changes or new projects and attach to this form.

Submit this form to the following address:

Indiana Department of Environmental Management  
Office of Air Quality, Compliance Branch  
ATTN: Roger Letterman  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015

## Notification of Ozone Control Period Results

In order for IDEM to evaluate and confirm NOx allowance requests from the EE/RE set-aside, use this form to provide information concerning actual electricity and other energy savings that occurred during the ozone season. In addition to the application forms, please submit any information that would aid IDEM in verifying the energy and emission savings projected, such as copies of manufacturers' specifications, past utility bills, emission rate reports, modeling data, etc.

For administrative purposes only:			
Date received:			
Project code:			
Project sponsor name:			
NOx account number:			
Authorized account representative:			
Contact person:		Telephone number:	
Fax number:		Email address (optional):	
If the overall project involves more than one project site, please provide the following information for all project sites.			
Project site name:			
Project site address:		City:	
Contact person:		Telephone number:	
Fax number:		Email address (optional):	
Project site name:			
Project site address:		City:	
Contact person:		Telephone number:	
Fax number:		Email address (optional):	
Project site name:			
Project site address:		City:	
Contact person:		Telephone number:	
Fax number:		Email address (optional):	

If additional space is needed, duplicate this page as necessary and attach.

**NOx Budget Trading Program  
EE/RE Set-Aside  
Notification of Ozone Control Period Results**

Measurement and Verification Methodology


<b>Project implementation date:</b>	
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**Actual Savings/Generation due to Project - Choose the appropriate table for the type of project implemented.**

**End use energy efficiency projects - electricity**

Type of Electricity End Use Project	Energy Efficiency Measure and Quantity of Equipment	kW Savings per Energy Efficiency Measure	Hours of Operation	Total kWh Savings

**End use energy efficiency projects - other energy**

Product Produced	Energy Consumed per Unit of Product Produced Prior to Implementation	Energy Consumed per Unit of Production After Implementation	Units of Product Produced After Implementation	Pre-project NOx emission rate	Post-project NOx emission rate	Post-project NOx Emission Reduction

**NOx Budget Trading Program  
EE/RE Set-Aside  
Notification of Ozone Control Period Results**

**Zero-emission renewable energy and methane gas electricity generation**

Type of Project	Rated Generation Capacity	Percent of Generation Capacity Realized	Total kWh Generated

**Highly efficient electricity generation - end user**

Type of Electricity Generation	Quantity of Equipment	Generation Capacity	NOx Emission Rate	Hours of Operation	Electricity Produced

**Highly efficient combined heat and power - end user**

Type of Combined Heat and Power System	Fuel Consumed per Hour of Normal Operation	Electricity Generated per Hour of Normal Operation	Heat Effectively Used per Hour of Normal Operation	NOx Emission Rate per Hour of Normal Operation	Hours of Operation

**Highly efficient electricity generation/efficiency improvements - utilities**

NOx Emission Rate Before Improvement or Replacement	NOx Emission Rate After Improvement or Replacement	Number of Megawatt Hours of Operation	NOx Savings After Improvement or Replacement

**NOx Budget Trading Program  
EE/RE Set-Aside  
Notification of Ozone Control Period Results**

To be completed by Project Sponsor

Amount of NOx allowances claimed:		Ozone season year:	
Printed name:			
Signature:			
Date:			

<b>Certification</b>
Authorized account representative
I am authorized to make this submission on behalf of the owners and operators of the NO <sub>x</sub> budget sources or NO <sub>x</sub> budget units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.
Signature:
Printed Name:
Date:

Submit this form to the following address:

Indiana Department of Environmental Management  
Office of Air Quality, Compliance Branch  
ATTN: Roger Letterman  
P.O. Box 6015  
Indianapolis, Indiana 46206-6015

## Instructions for Notification of Results Form – EE/RE Set-aside

In addition to the application forms, please submit any information that would aid IDEM in verifying the energy and emission savings projected, such as copies of manufacturers' specifications, past utility bills, emission rate reports, modeling data, etc.

### Project sponsor information

Project code number: Please provide the project code assigned to this project and included with the initial approval letter.

Project sponsor name: Please provide the name of the person or entity that will be sponsoring the project and requesting the NOx allowances.

NOx account number: Please provide the account number for the NOx Allowance Tracking System Account for the project or project sponsor.

Authorized account representative: Please provide the name of the authorized account representative for the NOx account.

Contact person information: Please provide the name of the person to be contacted for information concerning the project. Also include telephone and facsimile numbers for the contact person. An email address should also be provided, if available.

### Project site information

Project site name: Self explanatory.

Project site address: Please provide the address of the project site, including the city where the project is located.

Contact person information: Please provide the name of the person to be contacted for information concerning the project. Also include a telephone and facsimile numbers for the contact person. An email address should also be provided, if available.

Where the project includes more than one project site, please provide the information above for each of the project sites and attach to the application.

### Measurement and verification methodology

Please explain the project measurement and verification methodology and attach a detailed measurement and verification plan with diagrams and any other pertinent information. Specify what the pre-project and post-project energy consumption and/or production are estimated to be for this project. If more space is needed, please attach additional information. For more information, please see the Indiana NOx Trading Budget Program, Energy Efficiency and Renewable Energy Set-Aside Guidance Manual.

### Project implementation date

Please provide the date on which the project began energy savings or generation. If the overall project consists of separate projects, provide the various implementation dates for the individual projects.

## End use energy efficiency projects – electricity

### Type of Electricity End Use Project

Describe the type of project that was implemented. Example: building lighting retrofit, HVAC retrofit or entire building insulation retrofit.

### Energy Efficiency Measure and Quantity

Describe the energy efficiency measure that were installed or implemented and include the quantity, where applicable. Example: 2000 T8s with electronic ballasts.

### kW Savings per Energy Efficiency Measure

Provide the kilowatt savings for each energy efficiency measure that was installed or implemented.

**NOTE: Attach calculations and explanations for electricity savings, including pre- and post-project consumption for retrofits or comparison of high-efficiency equipment to standard equipment for new installations.**

### Hours of Operation

Provide the number of hours that the energy efficiency measures were operated during the ozone season (May 1 through September 30). If the energy efficiency measure operated the entire ozone season, the hours of operation would be 3,672 hours.

### Total kWh Savings

Provide the total kilowatt-hour savings for the project over the course of the ozone season. This is calculated by multiplying the number of energy efficiency measure, the kilowatt savings per energy efficiency measure, and the hours of operation.

### Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project. One equation is for projects sponsored by end users or non-utility third parties and the other is for projects sponsored by utilities.

End users/non-utility

$$\text{Allowances} = (\text{kWS} \times 0.0015) / 2000$$

Utilities

$$\text{Allowances} = (\text{kWS} \times 0.000375) / 2000$$

kWS = Total number of kilowatt-hours saved during the ozone season.

## End use energy efficiency projects - other energy

### Product Produced

Describe the product produced or manufactured. Example: units of manufacture (wood cabinets, metal furniture, automotive parts) or pounds of steam.

### Energy Consumed per Unit of Product Produced Prior to Implementation

Provide the amount of energy consumed per unit of product produced prior to implementation of the proposed project. Include the unit of measure (Btu, mmBtu).

### Energy Consumed per Unit of Production After Implementation

Provide the amount of energy consumed per unit of product produced after implementation of the proposed project. Include the unit of measure (Btu, mmBtu).



#### Units of Product Produced After Implementation

Provide the number of products produced per ozone season (May 1 to September 30) after the project was implemented.

#### Pre-project NOx Emission Rate

Provide the NOx emission rate prior to implementation of the project in pounds of NOx emitted per mmBtu of energy consumed. The emission rate is the average emission rate during the ozone season, May 1 to September 30.

#### Post-project NOx Emission Rate

Provide the NOx emission rate after the project was implemented in pounds of NOx emitted per mmBtu. The emission rate is the average emission rate during the ozone season, May 1 to September 30.

#### Post-project NOx Emission Reduction

Provide the NOx emission reduction over the ozone season after project implementation. This is calculated by multiplying the energy consumed per unit, the estimated unit of product produced and the NOx emission rate. Each of these values should be only for the ozone season, May 1 to September 30.

#### Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project. One equation is for reductions from emission units that are not subject to the NOx budget trading program and one for units that are subject to the NOx budget trading program (see applicability under 326 IAC 10-4-1).

Units not subject to trading program

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) \times \text{Pt2} \times \text{NPt2} \times (\text{NPt1}/\text{NPt2}))/2000$$

Units subject to trading program

$$\text{Allowances} = (((\text{Et1}/\text{Pt1}) - (\text{Et2}/\text{Pt2})) \times \text{Pt2} \times \text{NPt2} \times ((\text{NPt1}/\text{NPt2}) \times 0.25))/2000$$

Et1 = Energy consumed per ozone season prior to implementation

Et2 = Estimate of energy consumed per ozone season after implementation

Pt1 = Units of product produced per ozone season prior to implementation

Pt2 = Estimated units of product produced per ozone season after implementation

NPt1 = NOx emission rate prior to implementation

NPt2 = NOx emission rate after implementation

### **Zero-emission renewable energy and methane gas electricity generation**

#### Type of Project

Describe the type of project that was implemented. Example: landfill gas project with 4 generators, wind farm project with 10 generators or an anaerobic digestion project with 1 generator.

#### Rated Generation Capacity

Provide the manufacturer's generation capacity ("nameplate capacity") of the generator(s). If the project involves several generators with different generation capacities, provide the rated generation capacity of each generator and number of like generators.

#### Percent of Generation Capacity to be Realized

Provide the percent of maximum generation capacity that was realized during the ozone season (May 1 to September 30).

#### Total kWh Generated

Provide the amount of electricity generated during the ozone season (May 1 to September 30) in kilowatt hours.

#### Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = (\text{kWG} \times 0.0015) / 2000$$

kWG = The total number of kilowatt hours generated during the ozone season (May 1 to September 30).

#### **Highly efficient electricity generation – end user**

##### Type of electricity generation

Describe the type of equipment used to generate electricity (combined cycle, microturbine or fuel cell). To be eligible to apply under this category, the equipment must meet the following efficiency thresholds:

For combined cycle > 500 kilowatts generating capacity, a rated energy efficiency greater than or equal to 50%.

For microturbines ≤ 500 kilowatts generating capacity, a rated energy efficiency greater than or equal to 40%.

For fuel cell systems, a rated energy efficiency of 40%.

##### Quantity of equipment

Provide the quantity of equipment that was installed and operated.

##### Generation capacity

Provide the generation capacity of the equipment. Normally this is the maximum design capacity from the manufacturer (also known as “nameplate capacity”).

##### NOx emission rate

Provide the actual NOx emission rate in pounds of NOx per kilowatt of electricity produced (lb/kW).

##### Hours of operation

Provide the hours of operation for the equipment during the ozone season (May 1 to September 30).

##### Electricity produced

Provide the amount of electricity produced during the ozone season (May 1 to September 30) in kilowatt-hours (kWh).

#### Calculation of Allowances

Use the following equations to calculate the number of allowances that can be requested for the project.

For projects not subject to rule and sponsored by end-users or non-utility third parties:

$$\text{Allowances} = (\text{kWG} \times (0.0015 - \text{NOx})) \div 2000$$

For projects subject to the rule and sponsored by owners/operators of units subject to the rule:

$$\text{Allowances} = (\text{kWG} \times (0.0015 - \text{NOx}) \times 0.25) \div 2000$$

kWG = The number of net kilowatt-hours of electricity generated during the ozone season (May 1 to September 30).

NOx = The NOx emission rate measured in pounds per kilowatt-hour (lbs/kWh).

### **Highly efficient combined heat and power – end user**

#### Type of combined heat and power system

Describe the type of combined heat and power system constructed. Example: a microturbine with heat recovery system.

#### Fuel consumed per hour of normal operation

Provide the fuel consumption per hour of normal operation (gallons of fuel oil, cubic feet of gas, etc.).

#### Electricity generated per hour of normal operation

Provide the amount of electricity generated per hour of normal operation in kilowatt-hours (kWh).

#### Heat effectively used per hour of normal operation

Provide the amount of heat effectively used in Btus per hour (Btu/hr) of normal operation.

#### NOx emission rate

Provide the NOx emission rate in pounds per hour (lbs/hr) of normal operation.

#### Hours of operation

Provide the hours of operation during the ozone season (May 1 through September 30).

#### Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = ((\text{BtuIn} \times \text{Eff}) \div 3,412) \times (0.0015 - (\text{NOxRate} \div \text{EnRate})) \div 2000$$

BtuIn = The number of Btus of fuel used to produce electricity, heat, or steam during the ozone season (May 1 to September 30).

Eff = The effective net efficiency of the combined heat and power system, calculated as  
 $(\text{kWG} \times 3,412) \div (\text{BtuIn} - \text{HeatOut})$

kWG = The number of net kilowatt-hours of electricity generated during the ozone season.

HeatOut = The number of Btus of heat or steam effectively used for space, water, or industrial process heat during the ozone season divided by 0.8.

NOxRate = NOx emitted during normal operation, measured in pounds per hour (lbs/hr).

EnRate = The amount of energy, measured in Btus per hour of operation (Btu/hr), of electricity generated and heat or steam effectively used for space, water, or industrial process heat, divided by 3,412.

### **Highly efficient electricity generation/efficiency improvements – utilities**

#### NOx Emission Rate Before Improvement or Replacement

Provide the NOx emission rate from the unit before the efficiency improvement or generation replacement in pounds per net megawatt hour of electricity produced (lb/MWh).

#### NOx Emission Rate After Improvement or Replacement

Provide the NOx emission rate from the unit after the efficiency improvement or generation replacement in pounds per net megawatt hour of electricity produced (lb/MWh).

Number of Megawatt Hours of Operation

Provide total number of megawatt hours of operation during the ozone season (May 1 to September 30).

NOx Reduction After Improvement or Replacement

Provide the amount of NOx emissions that were reduced during the ozone season (May 1 to September 30) after the efficiency improvement or generation replacement. The reduction can be calculated by multiplying the difference in the NOx emission rate before and after the change by the total megawatt hours of operation.

Calculation of Allowances

Use the following equation to calculate the number of allowances that can be requested for the project.

$$\text{Allowances} = ((Et1 - Et2) \times h) \times 0.25/2000$$

Et1 = The NOx emission rate in pounds per megawatt hour for the unit before the improvement or replacement.

Et2 = The NOx emission rate in pounds per megawatt hour for the unit after the improvement or replacement.

h = The number of megawatt hours of operation during the ozone season.